APPENDIX 6

Atty. Dkt. No. 080542-0165

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Noriya HAYASHI et al.

Title: PREPREG FOR FIBER REINFORCED PLASTIC AND PRODUCTION PROCESS THEREOF

Appl. No.: 10/807,737

Filing Date: 3/23/2004

Examiner: Jill M. Gray

Art Unit: 1774

Confirmation Number: 4615

DECLARATION UNDER 37 CFR 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Noriya Hayashi, hereby declare as follows:

1. I am one of the namely inventors of the above-captioned application.

2. My academic background and work experience are summarized in item 2.

3. I received my Bachelor in polymer engineering from Fukui University in the year of 1991. In the year of 1993, I received my Master in polymer engineering also from Fukui University in 1993. Since then I have worked in the field of matrix resins for FRP at Mitsubishi Heavy Industries, LTD. in Japan. I am currently working as an assistant manager at the chemical research section of the engineering research department in Nagoya Aerospace Systems of Mitsubishi Heavy Industries, LTD.

4. I understand that the Office Action dated January 11. 2007 ("Office Action") has invited factual evidence to substantiate the claim recitation "wherein the prepreg is obtained by carrying out semi-curing while keeping the matrix resin composition at a temperature lower from the curing temperature by at least 10°C".

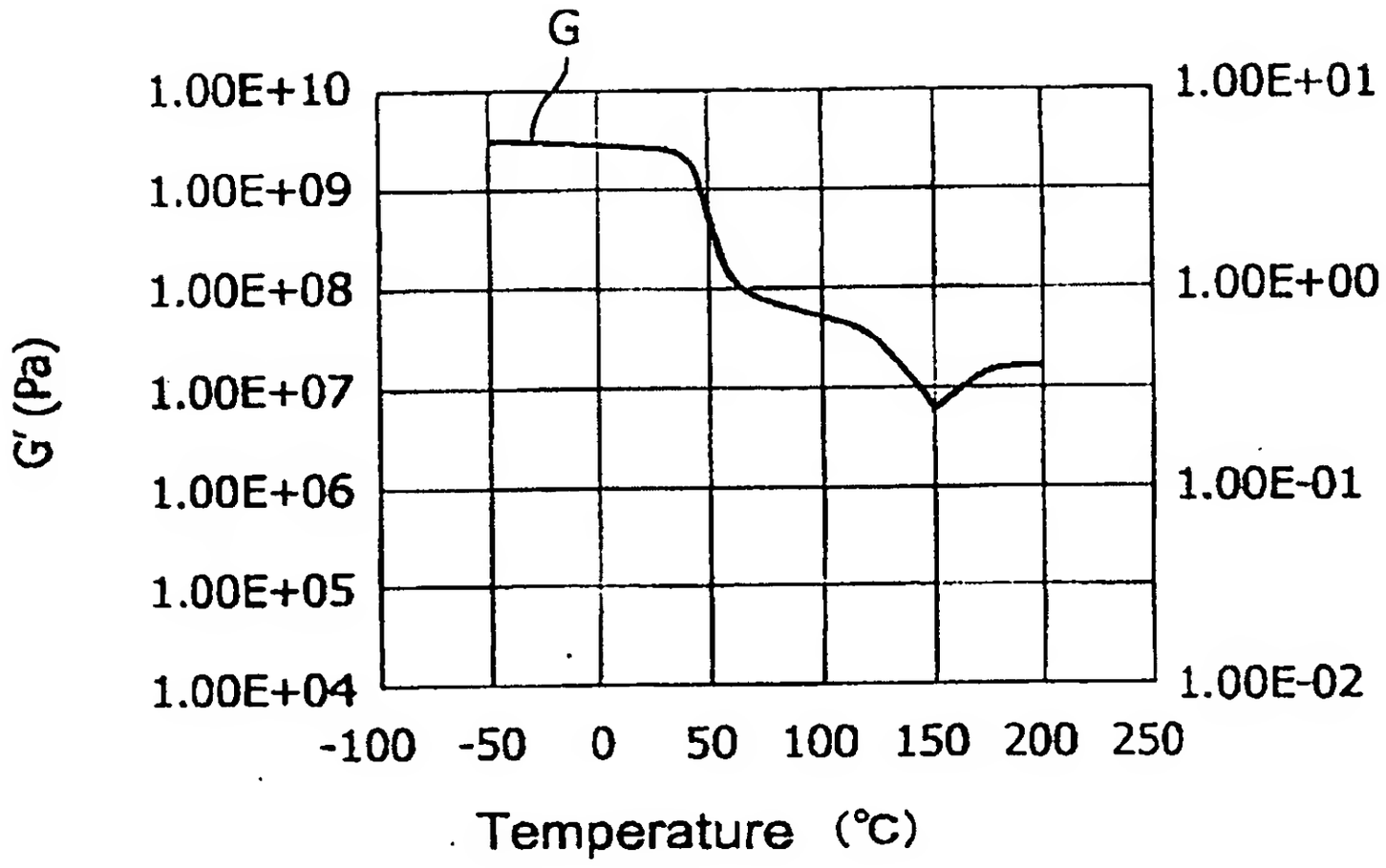
5. I have directed experiments and the results are as follows:

- Cured products under the conditions to produce prepregs by curing melts again at higher temperatures. These melted products proceed to be cured and bridging reactions also proceed. Eventually, the finally cured products do not melt again. Fig. A shows these phenomena.
- Fig. A shows these phenomena in connection with torsional properties (change of the storage modulus). In Fig. A, the properties maintain a certain value from -50°C to nearly 50°C. At the temperature of 50°C, a glass transition point appears. At the glass transition point, a transition from solid (glass state) to rubber elastic body occurs. Then, the curve goes down slowly. Further continuation of heating makes the curve incline sharply around the temperature of 125°C. Here, the second transition point (phase transition from solid to liquid) appears. When the temperature reaches 150°C at the bottom of the curve, the solid is almost liquefied. Then, the modulus of elasticity rises again. This proves that curing further proceeds after liquefaction (crosslinking density increases). The curing is completed afterwards. The phenomena will appear likewise also on other prepregs in accordance with the present invention which are obtained by carrying out semi-curing while keeping the matrix resin composition at a temperature lower from the curing temperature by at least 10°C.
- FRPs are employed in the samples illustrated in Fig. A. The samples are therefore able to maintain their shape due to the fibers impregnated in the resin composition.
- Rather than FRP, we initially studied plate-shape samples made only from resin. We quickly recognized that the liquefied product lacks initial curing. However,

since the fibers impregnated in the resin keep the shape, we thought that it is appropriate to use FRP as an actual product.

- As to the resin in which curing is finally completed, when its temperature is reduced, it becomes solid via the glass transition point. When this sample is measured under the same condition again (the second measurement), the transition from glass state to rubber elastic body at the glass transition point was measured. However, the curve which shows the phase transition from solid to liquid no longer exists. The curve showing the properties of the obtained final product is reversible against temperature, although not shown.
- Significant features of the resin composition adopted in the present invention include the liquefaction from the rise in temperature subsequent to rubber state as well as the solidification (insolubilization) by proceeding of the curing reaction again from the rise in temperature subsequent to the liquefaction.
- Regarding CFRP obtained, for example from Sample 1 in Example 2, it is confirmed that when semi-cured plural pieces of prepreg are heated again and cured, the resin compositions are completely integrated with each other under pressure. This does not happen if the impregnated resin composition is once liquefied and then, cured. That is, this shows the same behavior as that in Fig. A.

Fig. A



I further declare that all statements made in this declaration of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful, false statements and the like so made are punishable by fine or imprisonment, or both, under Section 18 USC § 1001 and that such willful, false statements may jeopardize the validity of legal decision of any nature based on them.

Date 2007 / July / 02

Noriya Hayashi

Noriya Hayashi